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U. S. NAVY ENLISTED JOBS: AN ANALYSIS

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U. S. Navy enlisted jobs were analyzed using the Position Analysis Questionnaire. The internal consistency of the analyses was assessed and several types of job-related information were extracted. Summaries are presented of similarities among Navy jobs, temperament and ability requirements of the jobs, relevant personnel tests, and equitable compensation.
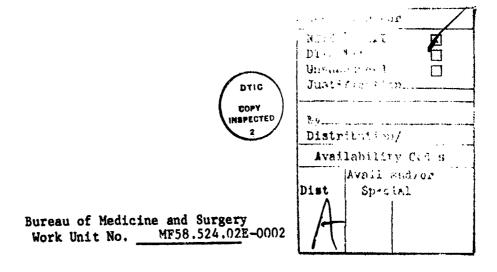
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SUMMARY

THE PROBLEM

Many decisions required of U.S. Navy personnel managers and researchers should be based on facts about navy enlisted jobs. For example, what jobs are most similar and dissimilar? What personnel tests are most relevant to which jobs? What are the critical performance dimensions of jobs? What human abilities and temperament attributes are characteristic of effective job performance? How are these abilities and attributes distributed across jobs in the navy? How much should each navy enlisted job be paid, compared to other jobs in the civilian sector having similar behavioral requirements?

FINDINGS

A structured job analysis method and associated data analysis techniques are described and used to provide answers to the above questions for a large sample of U.S. Navy enlisted jobs.

NAVY ENLISTED JOBS: AN ANALYSIS

Current advertising promotes the Navy as not just a job, but an adventure. To be precise, the Navy consists of 95 different enlisted jobs or ratings (U.S. Navy, 1981), as well as three major divisions of entry level or non-rated jobs. Each of these jobs requires specific mental abilities, physical capabilities, perceptual skills, and personality traits. For example, color vision may be required by ratings that use color-coded ordnance, electrical components, display symbols, or signal lights. Recent findings (Robertson, 1982) have indicated that physical strength and stamina requirements may vary widely among Navy ratings. Knowledge of these job-specific characteristics could be used to improve current personnel management practices, especially the placement of personnel, identifying cross-rating or inter-rating transfer requirements, developing training programs, and assessing the performance effects of environmental stressors encountered under operational conditions (such as heat, cold, hyberbaric pressure and ship or air-craft motion). In assessing the performance effects of environmental stressors, for example, impairments have been found among a large number of specific performance characteristics such as manual skills, learning and memory (Poulton, 1979). However, difficulty in applying this information to operational conditions has been encountered because of the low degree of confidence or proven validity in the relationship between performance on these tasks and the performance requirements of Navy enlisted jobs. Similarly, while a number of tests have been developed for selecting personnel into a variety of Navy enlisted jobs (e.g., Kinney, Luria & Ryan, 1980; Petho, 1981), the predictive power of these tests has been compromised because precise information about specific operational job performance require-

ments is either missing entirely or is not available in a form that can be readily translated in terms of the performance characteristics measured by these tests. Therefore, a need exists to develop a technique that will permit Navy jobs to be translated into the performance lexicon used by those who are responsible for assessing performance under environmental stress conditions, developing selection and placement tests, and managing the conglomerate of personnel training, evaluation and advancement programs that are critical to maintaining an effective Navy.

Fortunately, research originally sponsored by the Office of Naval Research and conducted by Ernest McCormick (e.g., McCormick, Jeanneret & Mecham, 1972) in the early 1970's has been instrumental in developing such a technique. As part of this work, McCormick and his associates gathered information on more than 458 Navy enlisted jobs in 48 ratings, as well as nine nonrated categories. Most of this work was done aboard aircraft carriers.

McCormick (1979) has referred to this technique as a structured job analysis because information about a job is collected using a questionnaire, the Position Analysis Questionnaire (PAQ). The PAQ consists of 194 statements about the importance of various occupational activities (job elements) in the job. The job analyst, who may be an incumbent, rates each statement on a scale ranging from 0 (i.e., the statement or element is not applicable to this job) to 5 (i.e., the statement or element is extremely important in this job compared with its importance to jobs in general). The job elements are divided among six PAQ categories. These categories are: (1) modes of information input to the worker; (2) types of mental information processing required; (3) modes of job output by the worker; (4) the social context of the job; (5) the job environment; and (6) miscellaneous information about the job. The PAQ is

especially suited for gathering information about the performance character-
istics required of workers on jobs because it emphasizes what the worker does
rather than what happens to the materials that are used by the incumbent.
Ratings of the job elements identified in the PAQ have also been related
directly to performance characteristics such as cognitive ability, physical
fitness, and temperament (McCormick et al, 1972; Marquardt & McCormick, 1972).

McCormick and his associates have recently compiled a data bank and de-
veloped analysis capabilities based on PAQ information (PAQ Services, Logan,
Utah 84321). This data bank includes information on about 4,000 jobs from the
civilian sector, in addition to the original Navy enlisted jobs that were
analyzed. This is possibly the largest and most complete job data bank in
existence. The analysis capability includes deriving performance characteris-
tics of jobs, estimating wage and salary comparability for similar jobs,
constructing clusters of jobs that have different titles but are similar in
terms of worker activities, determining similarities and differences among
various jobs, estimating the validity of tests used to select personnel for
specific jobs, and determining the degree to which several PAQ analyses of the
same job are in agreement (i.e., reliability).

This report is a condensation and reanalysis of the original Navy enlisted
job information collected by PAQ Services, Inc. using updated techniques and
procedures. Although the data are almost ten years old and some modifications
in Navy enlisted jobs have occurred during this period, these analyses should
provide insights about the applicability and validity of this technique, as
well as useful information about Navy enlisted jobs and personnel. Use of
these original data also avoided the costs associated with readministering the
PAQ to the hundreds of job incumbents required to obtain adequate information
on a large number of Navy enlisted jobs.

In the following work, the initial analysis will determine the internal consistency of the original PAQ data. Then, clusters or groupings of similar jobs will be derived and relationships among the jobs in these clusters will be examined. Next, the performance characteristics of the jobs will be determined. Finally, based on similarities in performance characteristics between Navy enlisted and civilian jobs, a determination will be made of pay differences that exist between the two job groups (i.e., comparability).

METHODS

The internal consistency of job data is the extent to which data obtained separately for the same or similar jobs are equivalent (i.e., consistent). If consistent data are not available for a job, then the data are unreliable and inferences cannot be made about the job. For instance, PAQ data from two incumbents in the same job are consistent if job elements rated "not applicable" by one incumbent are also marked low by the other, and conversely, elements rated high in importance by one incumbent are rated similarly by the other. The extent of agreement between incumbents can be represented by the product moment correlation coefficient (Winer, 1971), which varies from 1.0 (complete agreement), to 0 (no agreement), to -1.0 (complete disagreement). Another way to represent the degree of consistency is the proportion of the 194 PAQ elements that are rated similarly by two incumbents (e.g., within one point of each other on a six-point scale). If only two PAQ questionnaires (i.e., data for two incumbents) are available for a particular job, then only one correlation can be derived. If a large number (N) of completed questionnaires are available for a job, then $N \times (N-1)/2$ paired comparisons can be made, and a correlation coefficient can be derived for each comparison and the percent of similar ratings can be reliably determined. The latter procedure can be used

to identify those questionnaire respondents whose questionnaires are inconsistent with those of the other respondents; these questionnaires would then be deleted from further analysis. Once inconsistent data have been deleted, the 194 job element ratings on the PAQ can be averaged across the remaining respondents within a specific job. The resulting set of average or mean ratings is more representative of the typical responses of those who answered the PAQ (i.e., job incumbents) than would be true if the answers of any single respondent were used instead. Use of mean ratings derived from large groups or samples of respondents makes errors of interpretation from the data far less likely than if such interpretations are based on the responses of only one or a few incumbents. The smaller the sample of respondents, the greater the chance that the answers of this sample will deviate from (i.e., be atypical of) the majority of the population (i.e., the total job incumbents in a job) from which they were selected.

As described above, one measure of internal consistency was the degree of relationship or correlation (R) between the set of ratings obtained from one job incumbent and the ratings obtained from another incumbent from the same job (i.e., pairs). For determining the degree of relationship or agreement between the mean ratings for one group of incumbents within a job and the mean ratings for another group of incumbents within the same job, the R composite can be determined. The R composite is computed using the Spearman-Brown formula (Winer, 1971). This formula can also be used to estimate the relationship or degree of similarity between the mean ratings for two different jobs (e.g., hospital corpsman and dental technician).

Altogether, 458 Navy enlisted jobs were in the data bank. These jobs included various rates (e.g., Petty Officers and Chiefs) within different

ratings (e.g., Boatswain's Mate or Electrician's Mate). In order to simplify

the analysis, as well as to increase the size of the rating groups, data were

combined for Petty Officers Third and Second Class and for Petty Officers

First and Chiefs within each rating. Inasmuch as data for only six Senior and

Master Chiefs existed across the 458 enlisted jobs, the responses of this

group were combined into a single job sample. Nonrated personnel were put

into three job categories: AN (AR, AA, and AN), SN (SR, SA, and SN), and FN

(FR, FA, and FN). Rates/ratings having PAQ data for only one incumbent were

deleted from further analysis because of problems with atypical responses

discussed above.

RESULTS

Internal Consistency. Table 1 presents an overview of the data. For

each job category, the following internal consistency information is provided:

The number of personnel in the sample; the number of questionnaires deleted

because of inconsistency; R, the average correlation between PAQ job element

ratings obtained from pairs of incumbents; %, the average percent of ratings

across several pairs of job incumbents that were within one point of each

other; and R composite, the reliability of the mean job element ratings across

the total number of job incumbents.

The data in Table 1 indicate that internal consistency varied substan-

tially across the different job categories. For example, the responses of

Senior and Master Chiefs were more reliable than the responses of any other

group. This is a particularly remarkable finding because the Senior and Master

Chiefs represented six different Navy ratings. In contrast, nonrated personnel

showed the least internal consistency of any group. Apparently, those person-

nel with seniority and experience are either more similar to each other in the

types of jobs performed or are more careful in completing questionnaires(or some combination of these two factors) than junior, inexperienced personnel.

Similarities Among Navy Enlisted Jobs. One of the important questions asked by Navy personnel managers about Navy enlisted jobs is "which ones are similar?" Similar jobs are candidates for crosstraining, qualification in another rating by an individual (i.e., crossrating), similar personnel selection procedures, administrative organization (e.g., determining department and division structure), and similar job classification by Navy personnel management.

The 79 job categories in Table 1 were examined for similarities. In determining these similarities, the jobs were first evaluated in terms of 32 independent job dimensions developed by McCormick et al. (1972) from an analysis of 2200 jobs (mostly civilian). These dimensions were derived from a factor analysis of responses by job incumbents to the first 187 PAQ elements. In the factor-analysis, those elements correlating high with each other (i.e., rated in the same manner as each other by the job incumbents) but correlating low with other elements were combined into a comm ' factor. This procedure resulted in the 32 job dimensions (or factors) referred to above. A list of these 32 dimensions is provided in Table 2.

After rating each job along these 32 dimensions, jobs were compared for similarity using two techniques -- the Coefficient of Similarity and Mean Square for jobs. The Coefficient of Similarity (Cattell, 1949) determines the extent to which the profiles for two jobs are similar, using mean ratings of the 32 dimensions by job incumbents to establish the job profiles. The Coefficient of Similarity ranges from 1.0 (perfect match) to 0 (no match) to -1.0 (complete mismatch). This technique, however, fails to allow for the varia-

bility of incumbent responses that are typical of most rating procedures.

However, the Mean Square for jobs technique uses the same data as the Coeffi-

cient of Similarity, but accounts for response variability through use of the

MS Error term. The ratio, ms jobs/ MS Error, is a statistic that can be used

to estimate the probability (P) that jobs in a group (or cluster) of jobs are

identical. As can be seen from this ratio, the lower the response variability

(i.e., MS Error term) the higher will be the resulting P value. If P is high,

the jobs in the cluster are highly similar in terms of the 32 dimensions used

in this analysis.

Table 3 lists comparisons made between Navy enlisted jobs using these

techniques (Mecham, McCormick, & Jeanneret, 1977). Figure 1, the Navy Job

Family Tree, was used to determine which of these jobs should be compared

using the Mean square for jobs technique. This Navy Job Family Tree presents

in graphic form the interrelationship among Navy jobs as determined by the

Coefficient of Similarity. Jobs that were positively intercorrelated (near

1.0) clustered together, while jobs that were unrelated (intercorrelated near

0.0) were far apart. As can be seen from Table 3, jobs that were highly

correlated (i.e., highly similar) using the Coefficient of Similarity are not

necessarily similar if evaluated in terms of MS for jobs, MS Error, and P.

Therefore, while a high Coefficient of Similarity is necessary for jobs to be

identified initially as similar, it is not sufficient for such a determination.

The initial clustering method used to construct the Navy Job Family Tree

(Figure 1) conforms well to expectations about job similarities (i.e., the

procedure has "face-validity"). For example, expectations are that different

ratings within the same rate should cluster together, as demonstrated for the

AK (cluster 9), PR (cluster 15), PH (cluster 39), and CS (cluster 42) ratings.

Similar jobs with different names would also be expected to be found in the same cluster, such as AMH-AMS 3&2 (cluster 5), AT-AE 1&C (cluster 4), PN-YN 3&2 (cluster 6), FN-ET-MM 3&2 (cluster 8), ADJ-AMH 1&C (cluster 10), MM-AM 3&2 (cluster 13), and AZ-YN-PN 3&2 (cluster 14). Similarities were also found between the clusters formed using this analysis and clusters already in use by the Navy (U.S. Navy, 1981). In addition, jobs among senior rates within different ratings were shown to be similar using this technique. For example, cluster 48 included SCPO, MCPO, DP 1&C, AQ 1&C. At the other end of the seniority continuum, SN and AN rates formed cluster 2. The other non-rated category, FN, did not cluster with AN and SN until late in the clustering process, indicating only weak similarities between FNs and ANs - SNs. This poor association is probably the result of FN incumbents rating their jobs higher on dimensions 1 and 9 and lower on dimensions 4, 5, 25, and 31 (see Table 2) than AN and SN incumbents. Similarly, several jobs performed by rated Navy personnel failed to be strongly associated with other rates/ratings. Jobs such as HT 1&C, OS 3&2, ASM 3&2, DTG 1&C, PN 1&C, and RD 1&C seem to be unlike any other job(s) in the Navy, except in terms of general similarities. The apparent eccentricity of these jobs may be the result of limited sample size. The responses of only two incumbents were included in the data for HT 1&C, and only a single respondent was available for the other jobs.

The findings presented in Figure 1 indicate that jobs in clusters formed during the first few iterations of the analysis are quite similar while jobs in clusters formed later are only generally similar. What, then, should be the standard for defining jobs as similar or dissimilar? Such a standard should be based on the additional criteria of similarity (MS jobs, MS Errors and P)provided in Table 3. Clusters with Coefficients of Similarity in excess

of about .8 and Ps of .5 or greater appear to contain jobs that are extremely homogeneous. Such jobs could be treated the same for purposes such as personnel selection and placement, common training, transfers from one rating to another, and administrative organization. Even jobs that are weakly associated with each other could be managed together for these purposed depending on the constraints imposed by the management situation. Table 3 provides useful information for making these decisions.

Requirements of Navy Jobs. The Navy enlisted jobs listed in the preceding tables can best be described in terms of behavioral characteristics -- the mental abilities, physical capabilities, perceptual skills, and personality traits required to perform these jobs effectively. The PAQ data for each job can be represented conveniently using four different behavioral approaches: (1) the 32 job dimensions (Table 2), (2) scores on personnel tests, (3) aptitude requirements, and (4) interest and temperament attributes. The job dimension scores (Table 2) have been used to compute equitable compensation (Jeanneret, 1980) to predict morbidity and prevalence of occupational diseases (Shaw & Riskind, in press), and for determining job classifications, establishing training requirements, and developing performance appraisal standards (Mecham, McCormick, & Jeanneret, 1977). The job descriptions resulting from these four approaches may also be used for personnel selection and placement by an employer (McCormick, DeNisi, & Shaw, 1977), job search by prospective employees, and research on the performance effects of the work environment.

Methods or tests for assessing the behavioral characteristics of jobs are summarized in Tables 4 and 5. Table 4 lists the separate tests included in the Federal Employment Service General Aptitude Test Battery (GATB), along with corresponding military tests. Table 5 lists the aptitudes or abilities

that have been established by behavioral research as important in the perform-
ance of a wide variety of jobs, as well as interest and temperament attributes
that may be important to effective job performance.

Table 6 lists the Navy enlisted job categories in the sample, and the
behavioral characteristics (as determined by the PAQ, personnel tests, and
measures of aptitudes, interests, and temperaments) that are typical of each
job. In order to reduce the volume of information contained in Table 6, only
those dimensons that are characteristic of each job are listed. A character-
istic dimension is defined as being one that must be performed at a level of
proficiency representative of the upper (high) or lower (low) ten per cent of
jobs in the U.S. work force. (For jobs that do not fall within these upper
and lower ten per cent limits, the high and/or low dimensions that are closest
to these limits are listed, along with the corresponding percentage figures.)

Table 6 therefore provides behavioral characteristics that appear to be
necessary to perform each job effectively. In essence, Table 6 summarizes
much of the informaton contained in Tables 2, 4 and 7. For example, Table 4
indicates that spatial and clerical personnel tests are most relevant to Navy
enlisted jobs. With regard to temperament attributes, Table 7 shows, for
instance, that Navy enlisted jobs have unusually high requirements for risk
tolerance and resistance to fatigue. Navy enlisted jobs, in the aggregate,
require a temperament that is practical, with little need to be original or to
work with new ideas and concepts. The highly variable requirement for some
attributes (e.g., interest in scientific/technical activities) indicates that
measures of these attributes would be a useful part of a general personnel
placement test battery because such measures would identify those personnel
best suited for a job requiring a highly specialized behavioral characteristic.

However, attributes that are uniformly required throughout the Navy (e.g., temperament for working in groups) would be less useful for placement purposes, at least for specific jobs. Table 7 also provides similar information about job-related abilities. Abilities such as Word Fluency, Short-Term Memory, intelligence, and Ideational Fluency are required only to a modest extent by Navy enlisted jobs, while abilities such as Aesthetic Judgement, Visual Form Perception, Movement Detection, Tactual Acuity, Spatial Orientation, Manual Dexterity, Arm/Hand Positioning and Steadiness, Rate of Arm Movement, Eye-hand Coordination, Simple Reaction Time, Rate Control, and Mechanical Ability are required by many Navy jobs to a greater extent than by other jobs in the U.S. economy. Assessment of these abilities should be emphasized in research on the performance effects of job-related stressors (e.g., vibration, ship motion) because so many Navy jobs emphasize these behavioral characteristics. Additionally, the frequency with which these abilities occur across Navy jobs indicates that these abilities could serve as the basis for developing personnel selection and placement tests, designing training programs (including training evaluations), and assigning priorities to new hardware programs (i.e., those programs should be emphasized that are associated with the most frequently required abilities). Similarly, abilities that occur infrequently, such as Arithmetic Computation, Olfactory Acuity, and Gustatory Acuity, should be assigned low priorities in these personnel areas. Table 7, therefore, provides extremely useful and powerful information for those who have personnel management responsibilities.

Compensation for Navy Jobs. Every job, whether civilian or military, involves compensation of an employee for services or products rendered. Research on compensation indicates that employees assess primarily two factors

when comparing compensation for alternative jobs -- pay and prestige. The level of pay that a job provides is closely related to the behavioral characteristics required to perform the job. McCormick, Jeanneret, & Mecham (1972) have shown that jobs with similar scores on the 32 job dimensions listed in Table 2 were paid at similar rates. This finding was subsequently replicated with a huge sample of 2,200 jobs representative of the entire U.S. work force (Mecham, McCormick & Jeanneret, 1977). Hence, behavioral characteristics required for the job can be used to determine the extent to which pay is equitable (i.e., by comparing pay received for jobs consisting of similar behavioral characteristics). Using this technique, an answer to the question "What is fair pay for enlisted jobs in the Navy?" can be accurately determined.

The second important factor involving compensation is prestige. Treiman (1977) has shown that job prestige can be classified in terms of influence or desirability. For example, physicians have high prestige and garbage collectors have low prestige using this classification system. In general, for jobs with equal pay, a prospective employee will choose the job with higher prestige. A higher paying job may even be avoided because of low prestige. Mecham, McCormick, and Jeanneret (1977) showed that several techniques used to rate job prestige resulted in similar prestige hierarchies. Also, the rank of a job in a prestige hierarchy can be predicted accurately ($r = .95$) from ratings assigned to the 32 PAQ job dimensions listed in Table 2. Mecham, McCormick, and Jeanneret (1977) have also demonstrated that by modifying only a few of the dimensions for a job, not only may the aptitude requirements for the job differ substantially, but large variations in the prestige rating of the job may also result.

Table 8 provides data on the compensation and prestige (as rated by Navy personnel) of Navy jobs, and compares Navy compensation with compensation provided

for similar jobs in the civilian sector (in terms of 1972 dollars). The information in Table 8 has many possible uses. For example, although enlisted Navy jobs (i.e., rates) must have the same basic pay at a specific pay grade (or rating), differences in compensation between Navy rates and similar jobs in the civilian sector could nevertheless be used as one factor in establishing the size of reenlistment bonuses. An updated PAQ wage survey comparing civilian and military compensation for similar jobs could be used to justify increases in military pay and benefits. For example, Harris and McCormick (1973) used these data to show that Navy enlisted personnel were grossly undercompensated compared to civilian counterparts even after benefits such as exchanges, commissaries, and tax advantages were included in the compensation figures. A similar PAQ wage survey is now being conducted under the auspices of the Naval Military Personnel Command to determine the fairness of compensation to Navy enlisted personnel.

Discussions and Conclusions. Neither the data nor the analytic methods described in this report are original contributions. However, this report does offer a unique and relatively comprehensive view of enlisted jobs in the Navy. Jobs in 48 ratings (including separate determinations for junior and senior petty officers) and three nonrated jobs categories are described in terms that should be useful to Navy personnel managers. Additionally, the internal consistency of the job data was verified in order to determine the reliability of the information --the more reliable the information, the more confidence can be had in any conclusions drawn from this information.

Similarities among Navy enlisted jobs were described, and a cluster analysis (i.e., "Navy family tree") of enlisted jobs was developed to show which jobs are distinctly different and which are highly similar. These

findings indicate that similar jobs could be treated as being the same for some personnel management actions, including personnel selection, training, transfers from one rating to another, bonuses, evaluation, and administrative organization.

The behavioral characteristics of Navy enlisted jobs were described in terms of three different approaches. The first approach used a set of 32 dimensions based on the characteristics of civilian jobs. The second approach described jobs in terms of a federal employment test (the GATB) and related military personnel tests. The third approach used a large set of abilities and temperament characteristics to represent Navy enlisted jobs. This information could be helpful in personnel selection, placement, career counseling, and predicting the effects of unusual military environments on job performance.

The economic worth of Navy enlisted jobs compared to similar jobs in the civilian sector was then determined. Similarities between Navy and civilian jobs were determined using the data on behavioral characteristics described above. This information could be useful in establishing incentives (e.g., reenlistment bonuses) for Navy enlisted personnel in jobs with the largest pay discrepancies. Such incentives should improve retention of enlisted personnel in critical Navy jobs. In this regard, an updated salary survey of the U.S. economy, including Navy enlisted jobs, is being accomplished by PAQ Services (Logan, Utah). This survey should provide a basis for determining fair compensation f. Navy enlisted jobs.

Although this review of the characteristics of Navy enlisted jobs did not include all ratings and is based on data that are now nearly a decade old, it should nevertheless provide a better understanding of a systematic method for analyzing and classifying Navy enlisted jobs. Such a method should be of particular interest to Navy personnel managers and researchers.

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Table 1

Overview and Internal Consistency of PAQ Data on Navy Jobs

	Number of PAQ's in Sample				
Job Category	In Bank	Deleted	R	%	R Composite
ADJ 3&2	16		.69	.80	.97
ADJ 1&C	8		.65	.79	.93
ADR 3&2	2		.52	.60	.68
AME 3&2	3	1	.61	.79	.82
AMH 3&2	9		.60	.75	.93
AMH 1&C	3	1	.63	.77	.83
AMS 3&2	8		.56	.74	.91
ASM 3&2	1				
ATR 3&2	2		.41	.60	.58
AWN 3&2	1				
AZ 3&2	3		.57	.80	.80
AZ 1&C	1				
BM 3&2	5	1	.63	.80	.39
BM 1&C	2		.24	.63	.38
BT 3&2	22		.70	.82	.98
BT 1&C	10	2	.57	.70	.93
CS 3&2	4	1	.72	.81	.91
CS 1&C	2		.67	.83	.80
CYN 3&2	2		.53	.81	.69
DP 3&2	2		.38	.63	.55
DP 1&C	2		.53	.73	.69

Table 1 (Cont.)

Job Category		Number of PAQ's in Sample				
		In Bank	Deleted	R	%	R Composite
DS	3&2	2		.59	.71	.75
DTG	1&C	1				
EM	3&2	6		.56	.75	.88
EM	1&C	4	1	.46	.69	.77
ET	3&2	1				
ET	1&C	2		.69	.76	.81
ETN	3&2	3		.66	.77	.85
ETR	3&2	2		.72	.80	.84
EW	3&2	1				
GM	3&2	1				
GMG	3&2	1				
GMG	1&C	1				
GMT	3&2	1				
HM	3&2	4		.45	.76	.77
HM	1&C	4	1	.51	.62	.81
HT	3&2	3	1	.62	.73	.83
HT	1&C	2		.58	.71	.73
IC	3&2	2		.68	.83	.81
IM	3&2	1				
MM	3&2	47	3	.58	.72	.97
MM	1&C	13	3	.60	.75	.95
PH	3&2	2		.39	.63	.57

Table 1 (Cont.)

		Number of PAQ's in Sample				
Job Category		In Bank	Deleted	R	%	R Composite
PH	1&C	2		.39	.65	.56
PN	3&2	7	1	.57	.76	.90
PN	1&C	1				
PR	3&2	4		.63	.80	.87
PR	1&C	1				
QM	3&2	3		.58	.77	.80
RD*	3&2	6	2	.53	.67	.87
RD*	1&C	1				
RM	3&2	6	1	.47	.72	.84
RM	1&C	2		.55	.63	.71
SK	3&2	3	1	.45	.62	.71
YN	3&2	7	1	.59	.78	.91
AT	3&2	41	2	.53	.73	.96
AT	1&C	15	1	.57	.75	.95
SN		23	6	.42	.73	.94
FN		18	7	.46	.71	.94
AW	3&2	3		.45	.70	.71
AW	1&C	2		.70	.80	.82
AX	1&C	1				
ABE	3&2	8	3	.55	.68	.90
ABE	1&C	2		.58	.72	.74
ABF	3&2	4		.45	.66	.67

Table 1 (Cont.)

	Number of PAQ's in Sample				
Job Category	In Bank	Deleted	R	%	R Composite
ABF 1&C	1				
AN	30	10	.42	.67	.94
ABH 3&2	4		.58	.75	.84
AD 3&2	1				
SCPO,MCPO	6		.66	.82	.92
AE 3&2	13	4	.56	.73	.94
AE 1&C	7		.65	.75	.93
AK 3&2	5	1	.48	.71	.82
AK 1&C	4		.61	.80	.86
AM 1&C	1				
AO 3&2	3	2	.34	.69	.81
AQ 3&2	4	1	.47	.70	.78
AQ 1&C	1				
OS 3&2	1				

*Now OS, Operations Specialist

Figure 1.

NAVY JOB FAMILY TREE

Table 2

Job Dimensions Based on Analysis[1] of 2200 Jobs Representative of the U.S. Economy

		High	Low
1.	Interpreting What is Sensed	ASM 3&2	PN 1&C
2.	Using Various Sources of Information	ETR 3&2	CS 3&2
3.	Watching Devices/Materials for Info	ET 1&C	CS 1&C
4.	Evaluating/Judging What is Sensed	PH 3&2	QM 3&2
5.	Being Aware of Environmental Conditions	ABH 3&2	DS 3&2
6.	Using Various Senses	DT 1&C	RD 1&C
7.	Making Decisions	ET 1&C	PR 3&2
8.	Processing Information	RD 3&2	GMG 3&2
9.	Using Machines/Tools/Equipment	EM 1&C	BM 1&C
10.	Performing Activities Requiring General Body Movements	GM 3&2	DP 3&2
11.	Controlling Machines/Processes	PH 3&2	EM 3&2
12.	Performing Skilled/Technical Activities	AE 1&C	AD 3&2
13.	Performing Controlled Manual/Related Activities	HT 1&C	OS 3&2
14.	Using Miscellaneous Equipment	Navigator[2]	PR 1&C
15.	Performing Handling/Related Manual Activities	HT 1&C	AWN 3&2
16.	General Physical Coordination	Commercial Airplane Pilot[2]	CS 1&C
17.	Communicating Judgements	PN 1&C	ADR 3&2

[1]Mecham, McCormick, & Jeanneret (1977)

Table 2 (Cont.)

Dimension Title	Illustrative Jobs	
	High	Low
18. Engaging in General Personal Contacts	DT 1&C	DS 3&2
19. Performing Supervisory/coordination	SCPO, MCPO	IM 3&2
20. Exchanging job-related information	RD 1&C	DP 3&2
21. Public/related personal contacts	DT 1&C	RD 3&2
22. Being in a stressful/unpleasant environment	MM 3&2	AQ 1&C
23. Engaging in personally demanding situations	PN 1&C	ABF 3&2
24. Being in hazardous job situations	AO 3&2	RD 1&C
25. Working non-typical vs day schedule	AQ 1&C	RM 1&C
26. Working in businesslike situations	PN 1&C	AMH 3&2
27. Wearing specified vs optional apparel	Automobile Painter[2]	Grain Farm Worker[2]
28. Being paid on a salary vs variable basis	Intern [2]	Barber[2]
29. Working on an irregular vs regular schedule	HT 1&C	RM 1&C
30. Working under job-demanding circumstances	General Practitioner[2]	BM 3&2
31. Performing unstructured vs structured work	PH 3&2	BM 1&C
32. Being alert to changing conditions	RD 3&2	DP 3&2

[2]Civilian occupations (Mecham, McCormick, & Jeanneret, 1977).

Table 3

Statistics on the Navy Job Family Tree

Cluster Number	Job Categories	Similarity Coefficient	MS Jobs	MS Error	P(Same)
1.	BT3&2 — MM 3&2	.97	.83	.49	.009
2.	SN — AN	.95	.83	.72	.276
3.	ADJ 3&2 — AE 3&2	.95	.54	.39	.075
4.	AT 1&C — AE 1&C	.95	.44	.60	.863
5.	AMH 3&2—AMS 3&2	.94	.43	.53	.787
6.	PN 3&2 — YN 3&2	.93	.38	.38	.497
7.	Cluster 2 — AO 3&2	.93	.68	.73	.661
8.	Cluster 1 — FN	.94	.98	.48	.000
9.	AK 3&2 — AK 1&C	.90	.32	.53	.963
10.	ADJ 1&C — AMH 1&C	.94	.25	.54	.993
11.	EM 3&2 — AT 3&2	.96	.92	.53	.005
12.	MM 1&C — AM 1&C	.96	.21	.48	.995
13.	Cluster 3 — AME 3&2	.93	.43	.38	.254
14.	Cluster 6 — AZ 3&2	.88	.42	.35	.147
15.	PR 3&2 — PR 1&C	.90	.22	.38	.970
16.	ET 3&2 — AQ 3&2	.87	.22	.91	.999
17.	AW 3&2 — AX 1&C	.86	.22	.99	.999
18.	ADR 3&2 — HT 3&2	.80	.30	.41	.830
19.	Cluster 7 — BM 3&2	.90	.71	.71	.501
20.	Cluster 11 — IC 3&2	.94	.74	.52	.017
21.	Cluster 5 — ABF 3&2	.86	.64	.59	.305

Table 3 (Cont.)

Cluster Number	Job Categories	Similarity Coefficient	MS Jobs	MS Error	P(Same)
22.	Cluster 16 - ETN 3&2	.76	.37	.74	.999
23.	Cluster 9 - SK 3&2	.81	.47	.55	.824
24.	Cluster 4 - Cluster 10	.86	.62	.58	.342
25.	BT 1&C - EM 1&C	.84	.85	.47	.003
26.	Cluster 20 - RM 3&2	.90	.92	.54	.000
27.	S,MCPO - AQ 1&C	.89	.36	.48	.846
28.	ATR 3&2 - HM 3&2	.79	.58	.70	.769
29.	DS 3&2 - IM 3&2	.73	.30	1.14	.999
30.	GMG 1&C - ABE 1&C	.73	.31	1.26	.999
31.	Cluster 14 - Cluster 23	.76	.56	.43	.005
32.	AW 1&C - ABF 1&C	.73	.31	1.17	.999
33.	GM 3&2 - GMG 3&2	.58	.25	34.45	.999
34.	ET 1&C - HM 1&C	.72	.62	.38	.012
35.	Cluster 8- Cluster 21	.85	1.28	.50	.000
36.	DP 1&C - RM 1&C	.68	.55	.62	.640
37.	QM 3&2 - RD 3&2	.71	.95	.62	.026
38.	GMT3&2 - AD 3&2	.54	.28	34.45	.999
39.	PH 3&2 - PH 1&C	.66	.57	1.02	.960
40.	Cluster 29 - EW 3&2	.63	.33	1.68	.999

Table 3 (Cont.)

Table 3 (Cont.)

Cluster Number	Job Categories	Similarity Coefficient	MS Jobs	MS Error	P(Same)
41.	Cluster 25	.75	.90	.48	.000
	Cluster 12				
42.	CS 3&2 – CS 1&C	.68	.75	.22	.000
43.	Cluster 30 –	.81	.57	.61	.682
	Cluster 24				
44.	Cluster 25 –	.84	.82	.55	.000
	Cluster 22				
45.	Cluster 18 – CYN 3&2	.87	.72	.70	.397
46.	Cluster 34 – DP 3&2	.59	.69	.49	.015
47.	Cluster 35 –	.83	1.10	.50	.000
	Cluster 18				
48.	Cluster 36 –	.63	.70	.52	.013
	Cluster 27				
49.	AWN 3&2 – ABE 3&2	.80	.61	.90	.918
50.	Cluster 17 – AZ 1&C	.70	.35	1.26	.999
51.	Cluster 40 – ETR 3&2	.55	.44	1.01	.999
52.	Cluster 38 –	.87	.44	.43	.373
	Cluster 13				
53.	Cluster 44 –	.76	1.00	.56	.000
	Cluster 18				
54.	BM 1&C – ABH 3&2	.58	1.34	.59	.000

Table 3 (Cont.)

Cluster	Job	Similarity			
Number	Categories	Coefficient	MS Jobs	MS Error	P(Same)
55.	Cluster 50 – Cluster 43	.74	.58	.65	.894
56.	Cluster 46 – DTG 1&C	.52	.66	.62	.338
57.	Cluster 54 – Cluster 45	.75	1.09	.69	.000
58.	Cluster 33 – ASM 3&2	.41	.40	51.68	.999
59.	Cluster 39 – RD 1&C	.50	.63	1.29	.997
60.	Cluster 31 – Cluster 15	.67	.69	.42	.000
61.	Cluster 55 – Cluster 52	.68	.78	.55	.000
62.	Cluster 49 – Cluster 41	.63	1.03	.55	.000
63.	Cluster 37 – OS 3&2	.54	.98	.73	.031
64.	Cluster 48 – PN 1&C	.54	.77	.60	.016
65.	Cluster 62 – Cluster 47	.71	1.32	.51	.000
66.	Cluster 60 – Cluster 42	.54	.94	.40	.000
67.	Cluster 59 – HT 1&C	.29	1.01	1.04	.597
68.	Cluster 64 – Cluster 56	.37	.95	.61	.000

Table 3 (Cont.)

Cluster Number	Job Categories	Similarity Coefficient	MS Jobs	MS Error	P (Same)
69.	Cluster 61 – Cluster 32	.63	.83	.56	.000
70.	Cluster 53 – Cluster 51	.66	1.07	.58	.000
71.	Cluster 67 – Cluster 63	.23	1.28	.84	.000
72.	Cluster 70 – Cluster 58	.62	1.04	.61	.000
73.	Cluster 65 – Cluster 57	.56	1.94	.57	.000
74.	Cluster 68 – Cluster 66	.38	1.12	.46	.000
75.	Cluster 73 – Cluster 69	.48	1.84	.56	.000
76.	Cluster 74 – Cluster 72	.37	1.41	.55	.000
77.	Cluster 76 – Cluster 71	.29	1.55	.57	.000
78.	Cluster 77– Cluster 75	.31	2.01	.57	.000

Table 4

Table 4. United States Employment Service General Aptitude Test Battery

| | | Number of | |
| | | Job Categories | Comparable |
Abbreviation	GATB Test	for Which Best Test	Military Tests
G	Intelligence	2	
V	Verbal Aptitude	0	ASVAB Word Knowledge, GCT
M	Numerical Aptitude	3	ASVAB Arithmetic Reasoning, ARI
S	Spatial Aptitude	30	Space Perception
P	Form Perception	9	
Q	Clerical Perception	31	Clerical Aptitude, Test, ASVAB Numerical Operations, Attention to Detail
K	Motor Coordination	0	
F	Finger Dexterity	1	
M	Manual Dexterity	3	

Table 5
List of Behavioral Characteristics of Navy Jobs
(Marquardt & McCormick, 1972)

Interest/Temperament Characteristics

1. Variety of duties : duties often characterized by frequent change.

2. Repetitive/short-cycle operations: operations carried out according to set procedures or sequences.

3. Dealing with things/objects: preference for situations involving activities which deal with things and objects rather than activities concerned with people or the communication of ideas.

4. Processes/machines/techniques: situations which are nonsocial in nature, being primarily concerned with methods and procedures often of a mechanical or chemical nature.

5. Scientific/technical activities: using technical methods of investigating natural phenomenon using scientific procedures.

6. Dealing with people: i.e., personal contacts beyond giving and receiving instructions.

7. Social welfare: working with people for their presumed good.

8. Influencing people: influencing opinions, attitudes, or judgements about ideas or things.

9. Directing/controlling/planning: operations involving the activities of others, or processes with which others are involved.

10. Empathy: seeing things from another person's point of view.

11. Personal risk: risk of physical or mental illness or injury.

12. Conflicting/ambiguous information: ability to tolerate and critically evaluate information of an uncertain or opposing nature.

13. Pressure of time: working in situations where time is a critical factor for successful job performance.

14. Sensory alertness: alertness over extended periods of time.

15. Attainment of set standards: attainment of set limits, tolerances, or standards.

16. Working under specific instructions: i.e., those that allow little or no room for independent action or judgement in working out job problems.

17. Working alone: working in physical isolation from others, although the activity may be integrated with that of others.

Table 5 (Cont.)

Interest/Temperament Characteristics

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18. Separation from family/home: separation for extended periods of time.

19. Stage presence: speaking to or performing for an audience.

20. Prestige/esteem from others: working in situations resulting in high regard from others.

21. Tangible/physical end-products: working with material elements or parts which ultimately result in a physical product.

22. Sensory/judgmental criteria: arriving at generalizations, judgments, or decisions which require sensory discrimination or cognitive appraisal.

23. Measurable/verifiable criteria: arriving at generalizations, judgments, or decisions based on known or obtainable standards, characteristics, or dimensions.

24. Interpretation from personal viewpoint: interpretation of feelings, ideas, or facts in terms of personal viewpoint or values.

25. Susceptibility to fatigue: diminished ability to do work, either physical or mental, as a consequence of previous and recent work done.

26. Dealing with concepts/information: preference for situations that involve conceptual or informative ideas and the possible communication of these ideas to others.

27. Creative activities: preference for situations involving the finding of new solutions to a problem or new modes of artistic expression.

Aptitude Characteristics

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28. Verbal comprehension: ability to understand the meaning of words and the ideas associated with them.

29. Word fluency: ability to rapidly produce words associated with a given word.

30. Oral communication: ability to communicate ideas with gestures or with spoken or written words.

31. Numerical computation: ability to manipulate quantitative symbols rapidly and accurately, as in various arithmetic operations.

32. Arithmetic reasoning: ability to reason abstractly using quantitative concepts and symbols.

Table 5 (Cont.)

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Aptitude Characteristics

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33. Convergent thinking: ability to select from possible alternative methods, the method of processing information that leads to the potentially best answer or solution to a problem.

34. Divergent thinking: ability to generate or conceive of new or innovative ideas or solutions to a problem.

35. Intelligence: the level of abstraction or symbolic complexity with which one can ultimately deal.

36. Long-term memory: ability to learn and store pertinent information and selectively to retrieve or recall, much later in time, that which is relevant to a specific context.

37. Short-term memory: ability to learn and store pertinent information and selectively to retrieve or recall, within a brief period of time, that which is relevant to a specific context.

38. Aesthetic judgement: ability to make sensitive evaluations of artistic quality in one or more of the following: music, style, painting, sculpture, photography, architecture, etc.

39. Visual form perception: ability to perceive pertinent detail or configuration in a complex visual stimulus.

40. Selective attention: the ability to perform a task in the presence of distracting stimulation or under monotonous conditons without significant loss in efficiency.

41. Time sharing: the ability to utilize information obtained by shifting between two or more channels of information. The information obtained from these sources is either integrated and used as a whole or retained and used separately.

42. Perceptual speed: ability to make rapid discriminations of visual detail.

43. Closure: ability to perceptually organize a chaotic or disorganized field into a single perception.

44. Movement detection: ability to detect physical movement of objects and to judge their direction.

45. Spatial visualization: ability to manipulate visual images in two or three dimensions mentally.

46. Near visual acuity: ability to perceive detail at normal reading distance.

47. Far visual acuity: ability to perceive detail at distance beyond normal reading distance.

Table 5 (Cont.)

Aptitude Characteristics

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48. Depth perception: ability to estimate depth of distances of objects (or to judge their physical relationships in space).

49. Color discrimination: ability to perceive similarities or differences in colors or in shade of the same color, or to identify certain colors.

50. Auditory acuity: ability to perceive relevant cues by sound.

51. Olfactory acuity: ability to perceive relevant cues by smell.

52. Gustatory acuity: ability to perceive relevant cues by taste.

53. Tactual acuity: ability to perceive relevant cues by touch.

54. Body orientation: ability to maintain body orientation with respect to balance and motion.

55. Spatial orientation: the ability to maintain one's orientation with respect to objects in space or to comprehend the position of objects in space with respect to the observer's position.

56. Kinesthesis: ability to sense position and movement of body members.

57. Finger dexterity: ability to manipulate small objects (with the fingers) rapidly and accurately.

58. Ideational fluency: the ability to produce a number of ideas concerning a given topic. This attribute is only concerned with the number of ideas produced and does not extend to the quality of those ideas.

59. Originality: the ability to produce unusual or clever responses related to a given topic or situation. This attribute is concerned with the degree of creativity of responses and does not deal with the number of responses made.

60. Problem sensitivity: the ability to recognize or identify the existence of problems. This attribute does not include any of the reasoning necessary for the solution of a problem.

61. Manual dexterity: ability to manipulate things with the hands.

62. Arm/hand positioning: ability to make precise, accurate movements of the hands and arms.

63. Arm/hand steadiness: ability to keep the hands and arms immobilized in a set position with minimal tremor.

64. Continuous muscular control: ability to exert continuous control over external devices through continual use of body limbs.

Table 5 (Cont.)

Aptitude Characteristics

65. Rate of arm movement: ability to make gross, rapid arm movements.

66. Eye-hand coordination: ability to coordinate hand movements with visual stimuli.

67. Eye-hand-foot coordination: ability to move the hand and foot coordinately with each other in accordance with visual stimuli.

68. Speed of limb movement: this ability involves the speed with which descrete movements of the arms or legs can be made. The ability deals with the speed with which the movement can be carried out after it has been initiated; it is not concerned with the speed of initiation of the movements.

69. Simple reaction time: the period of time elapsing between the appearance of any stimulus and the initiation of an appropriate response.

70. Response integration: ability to rapidly perform various appropriate psychomotor responses in proper sequence.

71. Dynamic strength: ability to make repeated, rapid, flexing movements in which the rapid recovery from muscle strain is critical.

72. Static strength: ability to maintain a high level of muscular exertion for some minimum period of time.

73. Stamina: this ability involves the capacity to maintain physical activity over prolonged periods of time. It is concerned with the resistance of the cardio-vascular system to breakdown.

74. Explosive strength: ability to expend a maximum amount of energy in one or a series of explosive or ballistic acts (as in throwing, pounding, etc.)

75. Rate control: ability to make continuous anticipatory motor adjustments, relative to change in speed and direction of continuous moving objects.

76. Mechanical ability: ability to determine the functional inter-relationships of parts within a mechanical system.

Table 6

Behavioral Characteristics

Category	GATB Tests	PAQ Dimension Scores		Aptitude		Interest/Temperament	
		High[a]	Low[b]	High[a]	Low[b]	High[a]	Low[g]
ADJ 3&2	Q,S,K	10,14,24, 44	15,27,45,	62(89%) 76(86%)	29(13%) 37(17%)	11 25(67%)	27(11%) 1(12%)
ADJ 1&C	Q,S,K	14,24,44	11,15,27, 45	49(67%) 76(66%)	37(33%) 32(37%)	11(74%) 25(68%)	27(32%) 16(33%)
ADR 3&2	Q,S,M	14,22,24, 44	23,27,30, 45	48,65,53, 54,62,73	33,34,59,29, 35,37,28,58, 32,30,36	11,25,	1,26,27,9,8, 6,10,12,20
AME 3&2	S,Q,K	10,14,24 44	11,15,27, 45	62(82%) 63(81%)	37(13%) 43(18%)	11(83%) 21(79%)	19(15%) 27(17%)
AMH 3&2	S,Q,K	10,14,24, 44	15,27,45	62(84%)	37	11	27(10%)
AMH 1&C	S,Q,K	14,19,24, 44	15,27,31, 45	76(73%) 48(69%)	37(37%) 29(38%)	11(78%) 22(62%)	27(27%) 15(36%)
AMS 3&2	S,Q,P	14,22,24, 44	27	62(88%) 73(87%)	37 28(10%)	11,25	27(10%) 1(11%)
[c]ASM 3&2	S,M,P	1,3,13, 34	5,8,14	39,62,53, 75,76,45, 44,66,63	58,28,29, 50,30	4,3,15,15, 21,2	24,8,9,6,10, 7,19
ATR 3&2	S,N,M		27	38	30(23%)	4(80%)	6(25%)
[c]AWN 3&2	Q,S,G	1,10,14, 16,22,44	12,15,25, 27,41	69(79%) 75(78%)	37(16%) 35(20%)	11(86%) 25(75%)	15(15%) 16(15%)

Table 6 (Cont.)

Category	GATB Tests	PAQ Dimension Scores High[a]	Low[b]	Aptitude High[a]	Low[b]	Interest/Temperament High[a]	Low[b]
AZ 3&2	Q,P,N		27	57(71%)	49(25%)	13(68%)	11(29%)
c AZ 1&C	Q,S,N	3,12,14, 36	22,27	46,49	73(11%)	23(84%)	11(18%)
BM 3&2	Q,S,K	14,24,32, 44	27,30	73 54(90%)	37,32,35,43, 33,36	11,25	23,5,15
BM 1&C	S,Q,G	14,24,32	25,31,38	50(85%)	42(12%)	18(88%)	16,15
BT 3&2	S,Q,P	1,14,22, 24,44	27,38,45,	73(86%) 62(82%)	37(10%) 33(10%)	11,25	1(10%) 26(10%)
BT 1&C	S,N,P	1,14,19, 22,32,44	11,25,37, 38	76(72%) 73(69%)	37(27%) 28(27%)	11(84%) 4(72%)	27(26%) 26(29%)
CS 3&2	P.M.S	6.37,43	27,45	53(84%)	36(12%)	3(85%)	26(13%)
CS 1&C	F,Q,S	6,14,19, 42,43	3,38,45	49(78%) 52(70%)	42(24%) 57(28%)	18(61%) 7(60%)	14(22%) 16(31%)
CYN 3&2	Q,F,S	14,15	7,25	54,62,70 65,61	36,41	25(85%) 11(83%)	1,12,23
DP 3&2	S,Q,P	4,15	10	42(83%)	50(31%)	16	25(36%)
DP 1&C	S,N,Q	9,19		50(83%)	73(17%)	23(89%)	25(19%)
DS 3&2	S,N,P	3,9,12, 13,34	5,37,42,	46,57	30(32%) 28(33%)	15(89%) 4(86%)	6(26%) 24(27%)
c DTG 1&C	M,G,V	6,12,15, 18,33,34	27,36,42	50(69%) 57(69%)	49(18%) 42(19%)	19(83%) 8(78%)	13(19%) 25(19%)

Table 6 (Cont.)

Category		GATB Tests	PAQ Dimension Scores High[a]	PAQ Dimension Scores Low[b]	Aptitude High[a]	Aptitude Low[b]	Interest/Temperament High[a]	Interest/Temperament Low[b]
EM	3&2	S,P,N	24,44		62(84%)	30(15%)	11(90%)	1(14%)
EM	1&C	S,P,F	1,9,14, 19,34,44	27	38(87%) 76(78%)	30(31%) 29(32%)	13(74%) 4(72%)	27(35%) 6(36%)
cET	3&2	S,Q,F	9,12,14	27	46,76,45, 39	50(18%) 29(18%)	13,4,15	6(15%) 8(16%)
ET	1&C	S,G,N	2,3,7,9, 12,19,33, 34	27	38 39(78%)	54(35%) 69(41%)	5(80%) 15(78%)	25(33%) 17(37%)
ETN	3&2	S,Q,F	9,12,13, 14,34	27,29	46,76,38, 57,62	30(19%) 29(22%)	4, 21(89%)	6(17%) 24(18%)
ETR	3&2	S,P,G	1,2,9,11, 12,34	5,10,25, 38	46,38,57, 39,61,76 62,53	30(20%) 29(22%)	4,15,16, 14,13	18(15%) 7(20%)
cEW	3&2	P,S,G	1,9,12,20, 30,34	15,25,38	46(79%) 38(76%)	30(33%) 29(34%)	13(89%) 14(82%)	9(33%) 10(34%)
cGM	3&2	M,P,S	10,13,20, 24,41	11	73 65(89%)	34(11%) 37(12%)	11,25	18(13%) 20(13%)
cGMG	3&2	M,S,G	1,13,22	8,11,27, 45	73	40	11,3,2	18
cGMG	1&C	S,Q,K	14,19,24, 32,42	27,45	76(83%) 46(82%)	28(22%) 29(22%)	4(83%) 13(81%)	6(22%) 24(24%)
cGMT	3&2	Q,S,F	10,14,24	15,25,38	62	59(13%)	4(90%)	27(12%)
HM	3&2	S,N,M			38(87%)	42(28%)	27(64%0	13(38%)

Table 6 (Cont.)

Category		GATB Tests	PAQ Dimension Scores[a]		Aptitude		Interest/Temperament	
			High[a]	Low[b]	High[a]	Low[b]	High[a]	Low[b]
HM	1&C	S,F,P	12,34	27	40(87%)	49(36%)	5(87%)	18(38%)
HT	3&2	S,Q,P	13,14,22, 24,32,44	27,45	48(90%)	37,29,30,28	11	6,26,8
HT	1&C	S,M,F	3,13,14, 15,19,22, 34,42,44	29	73(86%), 55(82%), 68(82%)	33(18%) 34(20%) 28(22%)	11(80%) 3(78%) 4(73%)	18(15%) 7(16%) 1(18%)
IC	3&2	S,Q,P	12		46(88%)	50(17%)	13(81%)	6(19%)
C_LM	3&2	S,P,Q	3,8,9,24, 32,34	25,27,38 42	46 42(86%)	30(31%) 29(33%)	16 4(88%)	6(27%) 8(31%)
MM	3&2	S,Q,M	1,14,22, 44	27,35	73(81%) 62(80%)	29(15%) 37(15%)	11 25(86%)	27(14%) 26(14%)
MM	1&C	Q,S,P	1,14,19, 24,32,44	11,15,27, 38,45	76(73%) 44(72%)	28(25%) 37(26%)	11(83%) 25(72%)	27(22%) 26(26%)
PH	3&2	N,M,G	3,4,22, 23,44	29	38(80%) 49(74%)	28(30%) 33(31%)	14(63%) 3(60%)	17(24%) 1(29%)
PH	1&C	N,P,G	3,9,12, 34,45	29	38 46(80%)	28(36%) 36(36%)	4(65%) 3(58%)	25(31%) 17(25%)
PN	3&2	Q,N,S	14,16		59(65%)	42(17%)	18(75%)	4(25%)
C_PN	1&C	C,V,Q	3,6,17, 23,33	1,36	50,30,41, 58,59,29, 60,37,35, 28,34,33 36,40,32	63,74,66-65, 64,67,76,56, 62,57,71,45, 72,68,53,61, 70,55,54,75, 69,46,44,48, 39,73	9,8,19,16, 12,24,10, 20,7,26, 18,27	4,3,21,2,13, 15,11,16,25

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Table 6 (Cont.)

Category		GATB Tests	PAQ Dimension Scores High[a]	PAQ Dimension Scores Low[b]	Aptitude High[a]	Aptitude Low[b]	Interest/Temperament High[a]	Interest/Temperament Low[b]
PR	3&2	Q,M,P	3,14	27,45	53(89%)	29(11%)	11	9(12%)
cPR	1&C	Q,M,P	4,39	27,45	49,38,39,46	50(22%)	15(87%)	19(30%)
QM	3&2	Q,S,G	5,12,14,36	15,38	46,39,38	29(32%) 30(33%)	14(86%) 4(80%)	7(25%) 6(27%)
RD	3&2	Q,N,G	5,8,9,14,32	21,25,38,41	42,39,30,46(88%)	73(36%) 54(38%)	14,13,15,22(81%)	17(32%) 7(32%)
cRD	1&C	N,S,G	19,20,30,32,33	21,25,29,37,38	50(87%) 37(87%)	38(14%) 54(18%)	18(90%) 1(89%)	3(19%) 21(19%)
RM	3&2	Q,S,P	14	27	69(79%)	59(35%)	13(79%)	1(30%)
RM	1&C	G,N,P		15,25,31,38	50 40(89%)	48(21%) 54(22%)	18(87%) 20(85%)	2(23%) 11(23%)
SK	3&2	Q,F,S	14,44		68(63%)	38(32%)	13(60%)	27(29%)
YN	3&2	Q,S,N	16		58(64%)	49(23%)	18(65%)	11(31%)
AT	3&2	Q,S,P	9,14,24	15,27	62(89%)	30(15%)	11(87%)	19(13%)
AT	1&C	S,Q,N	14,19,24	15,27	62(65%)	37(35%)	11(68%)	27(32%)
SN		Q,K,S	14,24,44	27	54,73	36,37,35,43 33,32,60,41	11,25	5,23,15,1 12,27
FN		S,Q,K	14,24,44	27	54,62	30,33,28,29, 37,34,35	11,25	6,8,26,9,1, 19,27,10

Table 6 (Cont.)

Category		GATB Tests	PAQ Dimension Scores		Aptitude		Interest/Temperament	
			High[a]	Low[b]	High[a]	Low[b]	High[a]	Low[b]
AW	3&2	Q,S,N	9,14,23,44	4,15,27,41,43	49(89%) 76(83%)	73(26%) 28(27%)	5(75%) 4(74%)	19(22%) 6(22%)
AW	1&C	Q,S,N	1,7,9,12,14,24,32,36,44	11,13,15,25,38,41,43	76(90%) 49(89%)	73(18%) 30(28%)	13(87%) 22(87%)	6(26%) 19(27%)
cAX	1&C	Q,S,K	12,14,24	15,27,38,43	38(86%) 76(78%)	37(27%) 29(28%)	4(71%) 21(70%)	19(19%) 8(20%)
ABE	3&2	S,Q,P	1,10,14,19,22,24,32,44	25,38	73(83%) 69(82%) 44(80%)	37(19%) 35(20%) 34(20%)	25,11 14(69%)	1(17%) 23(18%) 27(20%)
ABE	1&C	S,P,Q	14,19,24,32,34	25,38	44(74%) 69(71%)	37(26%) 29(34%)	11(83%) 25(83%)	27(28%) 16(28%)
ABF	3&2	S,P,Q	14,19,24,32		49,46 39(90%)	29(14%) 30(14%)	4(87%) 11(85%)	6(12%) 10(15%)
cABF	1&C	Q,S,K	14,19,24,31,42,44	11,13,15,25,31,38	49(88%) 43(83%)	57(15%) 71(16%)	18(80%) 22(77%)	16(15%) 2(18%)
AN		Q,S,M	10,14,24,44	12,27	54,73	32,35,37,33,36,59,29,34,28	11,25	5,23,27,2,1,26
ABH	3&2	Q,S,M	5,14,19,24,32,40,42,44	12,27,30	69,47,44 55,48,75	34(13%) 39(14%)	11 13(98%)	27(10%) 26(12%)

Table 6 (Cont.)

Category		GATB Tests	PAQ Dimension Scores		Aptitude		Interest/Temperament	
			High[a]	Low[b]	High[a]	Low[b]	High[a]	Low[b]
c_AD	3&2	S,M,Q	10,14,19,24,44	5,11,15,27	76(80%) 61(73%)	42(26%) 34(30%)	11(88%) 4(83%)	18(19%) 27(25%)
S,MCPO		Q,S,K	14,19,42	31	34(89%) 58(89%)	57,61,53,70	7,18,9,1, 24	4,16
AE	3&2	Q,S,K	10,14,24, 32,44	11,15,27	62(86%) 46(85%)	29(16%) 37(17%)	11 25(88%)	27(13%) 1(15%
AE	1&C	S,Q,P	12,14,19, 24	15,27	46(78%) 76(76%)	29(37%) 28(38%)	13(68%) 4(67%)	27(34%) 8(38%)
AK	3&2	S,N,Q		27	34(77%)	75(13%)	18(82%)	14
AK	1&C	Q,S,N		27	28(69%)	45(22%)	18(74%)	14(11%)
c_AM	1&C	S,Q,P	22,24,32, 42,1,14, 19,20,44	15,27,45	76	30(22%)	4(85%)	18(21%)
AO	3&2	Q,S,F	14,24,44		73,54,62, 65,67,64	34(11%) 37(11%)	11,25	1(11%) 27(11%)
AQ	3&2	P,Q,S	9,12,34	15	46,42,39, 38,76	50(23%) 30(28%)	15,4	19(22%) 6(23%)
c_AQ	1&C	S,G,V	19	21,27	40,41,60 58,33,28, 34,29,35	54(11%)	20,9,7 8,24	3(14%)

Table 6 (Cont.)

Category	GATB Tests	PAQ Dimension Scores		Aptitude		Interest/Temperament	
		High[a]	Low[b]	High[a]	Low[b]	High[a]	Low[b]
C_{OS} 3&2	Q,S,N	3,5,9 14,19,20, 23,32,36, 42,44,45	13,15,21 25,29,38, 41,43 60(80%)	40 43(88%) 41(82%) 54(32%)	73(27%) 72(30%) 71(31%) 14(87%)	23(89%) 22(88%)	21(29%) 2(33%) 3(45%)

NOTE: Numbers in Table 6 refer to item numbers in Tables 2, 4, and 5. Percents in parentheses indicate the degree to which the job has extreme requirements for an attribute when no attribute is beyond the 10th or 90th percentile. For example, 62 (89%) means that only 11% of the jobs in the U.S. economy require more of attribute number 62 (arm/hand positioning) than the job under consideration.

a. Beyond 90th percentile if no percentile is indicated.
b. Below 10th percentile if no percentile is indicated.
c. Conclusions based on only one incumbent, data may be unreliable.

Table 7

Distribution of Behavior Attributes for Navy Enlisted Jobs

Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
No.[a]	95+	90+	80+	70+	60+	40-60	40-	30-	20-	10-	5-
1. Variety of Tasks	1	2	1	2	5	13	11	14	24	7	
2. Repetitive Tasks		2	1	8	18	30	12	3	4	1	1
3. Things/Objects	1	4	15	17	17	13	3	5	3	1	1
4. Processes/Machines	2	4	16	23	6	15	5	5	2	1	1
5. Scientific/Technical			8	3	11	24	12	6	11	4	1
6. Dealings with People	1	1	1	1	4	5	15	9	17	23	3
7. Social Welfare	1	2	3	5	3	13	16	15	21		1
8. Influencing people	1	1	2	3	7	13	15	8	26	4	
9. Directing/Controlling	1	2	2	3	5	17	13	11	22	3	1
10. Empathy	1	1	2	4	6	17	10	15	20	3	1
11. Personal Risk	12	9	9	9	11	14	9	3	3	1	
12. Ambiguous Information	1	2	4	4	2	23	14	7	20	4	1

Table 7 (Cont.)

Attribute No.[a]	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40⁻	30⁻	20⁻	10⁻	5⁻
13. Time Pressure	1	1	2	12	16	15	24 2	3	4		
14. Sensory Alertness	1	1	5	5	15	29	14 6	3	1		
15. Attainment of Standards	3	2	7	3	10	19	13 15	5	3		
16. Specific Instructions	1	4	4	9	5	28	15 7	4	3		
17. Working Alone					1	28	42 9				
18. Home Separation	1	3	5	3	7	23	14 15	8	1		
19. Stage Presence	1	1	3	3	8	15	10 16	20	2	1	
20. Prestige	2	1	2	2	7	19	12 14	16	5		
21. Tangible Ends	1	1	16	17	9	20	7 5	3		1	
22. Sensory Criteria	1		5	5	10	24	18 6	10	1		
23. Measurable Criteria			5	8	13	19	6 14	10	3	2	
24. Personal Interpretation	1	2		4	4	16	11 17	24	1		

Table 7 (Cont.)

No.[a] Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40⁻	30⁻	20⁻	10⁻	5⁻
25. Fatigue Susceptible	4	6	10	10	14	23	6	3	3	1	
26. Concepts/ Information	1		1	6	1	20	14	13	17		
27. Creative/ Activity	1		1	1	7	19	11	10	21	9	
28. Verbal/ Comprehension	1	1	2	3	4	15	12	13	20	9	
29. Word Fluency	1	1	1	4	5	9	12	15	22	10	
30. Oral Communication		1		3	3	5	13	12	13	21	9
31. Computation					1	52	20	7			
32. Arith. Reasoning	1		2	6	7	21	12	8	14	7	
33. Convergent Thinking	1	1	3	3	4	17	13	9	20	9	

Table 7 (Cont.)

Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40⁻	30⁻	20⁻	10⁻	5⁻
34. Divergent Thinking	1	1	2	3	5	17	12	9	20	10	
35. Intelligence	1	1	2	3	4	21	8	8	24	10	
36. Long-Term Memory	1	2	4	2	5	23	11	9	13	10	
37. Short-Term Memory	1		1	5	2	20	14	9	16	11	1
38. Aesthetic Judgement	4	5	11	13	9	22	8	7	1		
39. Visual Form Percept.		8	7	21	9	20	6	5	3	1	
40. Selective Attention	1	2	4	8	8	23	13	7	12	1	1
41. Time Sharing	1	1	4	2	6	26	11	12	13	4	
42. Perceptual Speed	2	3	5	6	10	22	11	14	7		
43. Closure				5	8	4	28	9	12	11	3
44. Movement Detection	1	1	14	24	12	17	5	3	2	1	

Table 7 (Cont.)

Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40⁻	30⁻	20⁻	10⁻	5⁻
45. Spatial Visualization	1	1	15	15	19	17		3	5	2	1
46. Near Visual Activity	6	5	14	13	8	20		8	3	1	1
47. Far Visual Activity		1	12	14	16	24		2	7	4	
48. Depth Perception		4	17	16	13	18		4	4	3	1
49. Color Discrimination	2	1	15	16	15	17		6	6	2	
50. Auditory Acuity	1	1	4	3	6	26		11	16	10	2
51. Olfactory Acuity					7	69		4			
52. Gustatory Acuity						51		28	1		
53. Tactual Acuity		3	21	18	15	11		5	4	1	
54. Body Orientation		8	5	13	8	31		3	4	1	1
55. Spatial Orientation		2	16	21	14	17		3	6	5	1
56. Kinesthesis			17	16	13	21		6	3	3	1
57. Finger Dexterity		6	11	19	16	18		1	4	3	1

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Table 7 (Cont.)

Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40-	30-	20-	10-	5-
58. Ideational Fluency	1	1	2	3	8	20	14	4	22	5	
59. Originality	1		4	3	9	17	12	8	19	7	
60. Problem Sensitivity	1	1	3	5	5	29	7	13	13	3	
61. Manual Dexterity		6	15	21	14	13	4	4	1	1	1
62. Arm/Hand Positioning		8	24	11	16	11	2	6	1	1	1
63. Arm/Hand Steadiness		2	24	16	17	11	4	2	2	1	1
64. Muscular Control		3	13	14	12	26	4	5	2		1
65. Rate of Arm Move.		4	20	13	16	16	4	4	2	1	1
66. Eye-Hand Coord.	1	1	19	16	16	14	5	4	2	1	1
67. Eye-Hand-Foot		4	11	14	11	30	5	4	1	1	1
68. Speed of Limb Move.			10	20	16	30	6	4	2		1

Table 7 (Cont.)

Attribute	Percentile (Compared with Jobs in the U.S. Work Force)										
	95+	90+	80+	70+	60+	40-60	40-	30-	20-	10-	5-
69. Simple React. Time	1	1	14	23	13	19	2	3	3		1
70. Response Integration		5	8	16	12	26	4	4	3	1	1
71. Dynamic Strength			13	15	13	24	6	5	3		1
72. Static Strength		1	12	16	9	27	3	8	3		1
73. Stamina	2	5	11	3	11	30	4	7	5	2	
74. Explosive			15	15	17	20	6	3	3		1
75. Rate Control		2	6	21	15	22	8	2	3		1
76. Mech. Ability	2	4	13	26	6	17	3	6	2		1

[a]Refer to Table 5.

Table 8

Compensation for Navy Jobs in 1972

Job Category	Median Compensation	Comparable Worth	Prestige* (0-100)
ADJ 3&2	388	606	36.8
ADJ 1&C	603	852	45.5
ADR 3&2	377	505	27.4
AME 3&2	389	620	40.3
AMH 3&2	423	705	33.0
AMH 1&C	663	923	48.7
AMS 3&2	389	655	37.9
ASM 3&2	366	598	35.4
ATR 3&2	423	660	50.6
AWM 3&2	411	839	48.8
AZ 3&2	381	512	43.8
AZ 1&C	569	718	60.5
BM 3&2	399	656	24.0
BM 1&C	518	905	35.1
BT 3&2	402	650	29.4
BT 1&C	620	949	41.8
CS 3&2	380	598	23.0
CS 1&C	630	880	32.5
CYN 3&2	377	412	30.3
DP 3&2	389	763	60.9
DP 1&C	555	890	57.8
DS 3&2	399	696	63.5

Table 8 (Cont.)

Job Category	Median Compensation	Comparable Worth	Prestige (0-100)
DTG 1&C	587	990	56.8
EM 3&2	417	680	40.7
EM 1&C	631	1,012	56.6
ET 3&2	429	592	51.4
ET 1&C	630	1,133	63.8
ETN 3&2	404	621	54.0
ETR 3&2	423	643	53.5
EW 3&2	457	762	50.7
GM 3&2	387	557	26.5
GMG 3&2	366	560	29.0
GMG 1&C	606	866	43.5
GMT 3&2	366	604	37.4
HM 3&2	415	674	47.5
HM 1&C	594	848	58.7
HT 3&2	387	700	36.0
HT 1&C	574	923	53.7
IC 3&2	392	600	44.8
IM 3&2	387	601	49.4
MM 3&2	410	593	33.5
MM 1&C	607	833	40.0
PH 3&2	437	875	55.9
PH 1&C	592	897	60.4

Table 8 (Cont.)

Job Category	Median Compensation	Comparable Worth	Prestige (0-100)
PN 3&2	396	609	48.5
PN 1&C	615	1,170	60.9
PR 3&2	399	518	33.0
QM 3&2	389	738	55.9
RD 3&2	409	791	66.0
RD 1&C	569	1,035	55.0
RM 3&2	401	582	44.9
RM 1&C	616	904	58.8
SK 3&2	426	680	50.2
YN 3&2	421	602	48.4
AT 3&2	400	626	42.2
AT 1&C	596	860	46.1
SN	336	490	26.3
FN	347	542	29.8
AW 3&2	447	782	53.9
AW 1&C	583	974	61.2
AX 1&C	522	761	45.1
ABE 3&2	388	871	38.7
ABE 1&C	630	1,005	41.6
ABF 3&2	394	680	33.7
ABF 1&C	653	1,095	43.0
AN	340	491	23.8

Table 8 (Cont.)

Job Category	Median Compensation	Comparable Worth	Prestige (0-100)
ABH 3&2	386	717	30.8
AD 3&2	411	860	39.6
S,MCPO	790	1,030	46.3
AE 3&2	408	676	38.4
AE 1&C	608	869	48.2
AK 3&2	442	761	47.2
AK 1&C	632	736	40.2
AM 1&C	541	850	43.9
AO 3&2	380	524	35.3
AQ 3&2	405	688	56.9
AQ 1&C	672	983	53.1
OS 3&2	N.A.	1,080	77.4

*Standard error of estimate is 5.96 units